CHAPTER V
BRIDGE REPORTS AND LAYOUTS

SECTION 5-04 GRADE SEPARATION REPORTS

5-04.1 PROCEDURE. Grade separation reports are prepared on Forms 105 Sl and 105 S2 by the district. The completed forms are submitted to GHQ Bridge by the district similar to the procedure followed on bridge survey reports. A bridge memorandum is prepared by GHQ Bridge which is handled in the same manner as the memorandum for other bridge survey reports. Grade separation reports for structures in interchange areas are not submitted until after interchange geometrics are approved. See Figure 5-04.4 for the grade separation bridge memorandum.

5-04.2 GRADE SEPARATION LAYOUT. Many of the criteria and principles pertaining to the layout of stream crossing bridges are also applicable to grade separation bridges.

Bridge length and substructure locations are usually controlled by horizontal and vertical geometrics. See Table 5-04.1 for minimum vertical clearances and Table 5-04.2 for minimum horizontal clearances.

For structures spanning freeway type facilities, two-span bridges with semi-deep abutments are used if the required span length does not exceed 135 ft. [45 m]. The centerline of bearing at the abutment is located midway between the toe of the end slope and the intersection of the end slope with the grade line over the bridge.

For highways over railroad grade separations, the minimum bridge length is controlled by a theoretical railroad cross section. See Figure 5-04.8. The distance from the track centerline (for multiple tracks, the outside track centerline) to the embankment slope at the elevation of the top of rail is 20 ft. [6 m]. This distance may be increased up to 8 ft. [2.4 m] on one side of the railroad to allow for a railroad off-track maintenance road. The need for the off-track maintenance road must be justified by the presence of an existing road or the railroad must provide evidence of future need for such a road.

5-04.3 INFORMATION NECESSARY. Form BR 105R is not required for grade separation reports. Forms 105 Sl and 105 S2 for grade separation reports include typical sections for both roads adjacent to the structure, the location of survey centerline and profile grade on the typical sections, and ramp details that will affect the structure, including the location of ramp base line, ramp surface type and width, and roadbed width. The thruway profile is indicated on Form 105 Sl for a distance of at least 500 to 1000 ft. [150 to 300 m] on each side of the proposed intersection. The crossroad profile is indicated on this form for a distance of at least 500 ft. [150 m] each side of the intersection. Contours are required for Form 105 S2, only where the structure is skewed more than 50 degrees and the natural ground elevation varies more than 10 ft. [5 m] within the limits of the structure. Where contours are required, they extend to a minimum radial distance of 500 ft. [150 m] from the intersection. If contours are not required, cross sections are submitted along both roads to beyond the limits of the structure. Other data required on grade separation reports, such as topography and offset profiles, are the same as the requirements for other bridge survey reports. Where the grade separation structure is over an existing pavement or railroad, the grade separation report includes cross sections or profiles along the pavement or railroad to the extent required for the survey as outlined in Chapter III. Where cross sections are submitted in lieu of profiles, the cross sections show the elevation of the pavement centerline and edges or the elevation of the railroad rails. When skewed grade separations over railroads are involved, an additional profile sheet on Form 105 Sl, shown as Figure 5-04.6, is to be included with the bridge survey report and preliminary layout. This additional sheet is to show the cross section at right angles to the railroad at the intersection of the centerline of the roadway of the structure and centerline of tracks. If multiple tracks are involved, the centerline of any main line track may be used. In cases of dual structures, separate cross sections are required for each structure. The cross section is to show railroad roadbed, rails, ditches, etc. All of this information is to be plotted within the upper half of the sheet. This sheet will be submitted to the railroad with the bridge layouts instead of the regular Form 105 Sl which shows the three profiles and sections parallel with our centerline. The bridge survey plat sheet (Form 105 S2 Figure 5-04.7) is to show a line at right angles to the railroad at the location of the cross sections taken as required in paragraph (1) above. The zero or 0+00 [0+000] point of the cross section is to be at or near the railroad right of way line and the direction in which the section is taken clearly shown. For examples of Forms 105 Sl and 105 S2 see Figures 5-04.1, 5-04.2, 5-04.3, 5-04.5, 5-04.6 and 5-04.7.

5-04.4 GRADES. Grades to the limits of the profiles are included on the report for the thruway and the crossroad. If the

grades are to provide balanced grading quantities, the same care as required for bridge survey reports is exercised. Figure 5-03.2 is used along with Table 5-04.1 to establish the relation of the grades at the intersection where minimum clearances control.

TABLE 5-04.1
MINIMUM VERTICAL CLEARANCES
FOR GRADE SEPARATION STRUCTURES

FACILITY UNDER STRUCTURE	CLEARANCE	CLEARANCE
Interstate and Principal Arterial Routes	16'-6" (incl. shoulders)	5.05 m (incl. shoulders)
Other State Routes > 1700 vpd	16'-6" (incl. shoulders)	5.05 m (incl. shoulders)
Other State Routes < 1700 vpd*	15'-6" (incl. shoulders)	4.75 m (incl. shoulders)
Other Streets and Roads*	14'-6" (does not incl. shoulders)	4.45 m (does not incl. shoulders)
Railroads	23'-0"	7.0 m

*To provide continuity of travel for taller vehicles exceptions can be made both rural and urban for any routes connecting to the systems where taller vehicles are allowed but not to exceed 16'-6" [5.05 m]. A minimum vertical clearance of 15'-6" is required for bridges located in commercial zones. A minimum vertical clearance of 17'-6" is required for pedestrian overpass facilities.

TABLE 5-04.2
MINIMUM HORIZONTAL CLEARANCES
FOR GRADE SEPARATION STRUCTURES

FACILITY UNDER STRUCTURE	CLEARANCE	CLEARANCE
Interstate , Primary and Urban Routes	30'	9 m
Ramps & Auxiliary Lanes	5'-3" from shoulder line	1.6 m from shoulder line
Other State Route	5'-3" from shoulder line	1.6 m from shoulder line
Other Streets and Roads	5'-3" from shoulder line	1.6 m from shoulder line
	2' from face of barrier curb	0.6 m from face of barrier curb
Railroads*	14'-0" & 22'-0" (min.)	4.3 m & 6.7 m (min.)

*Measured from centerline of track. The minimum clearance of 22'-0" [6.7 m] to be provided on one side of the track(s) is for off-track maintenance. If it is not obvious on which side of the track(s) this clearance is provided, a decision should be obtained from railroad's local representative. Assistance from GHQ Transportation may be required in some situations. Where narrow median is used, provide 5'-6" [1.7 m] minimum clearance from edge of traveled lanes to face of columns on median side.

5-04.5 EXAMPLES. Examples of acceptable completed Forms 105 Sl and 105 S2 for grade separation reports are shown on Figures 5-04.1, 5-04.2, 5-04.3, 5-04.5, 5-04.6 and 5-04.7. The bridge memorandum is illustrated on Figure 5-04.4.